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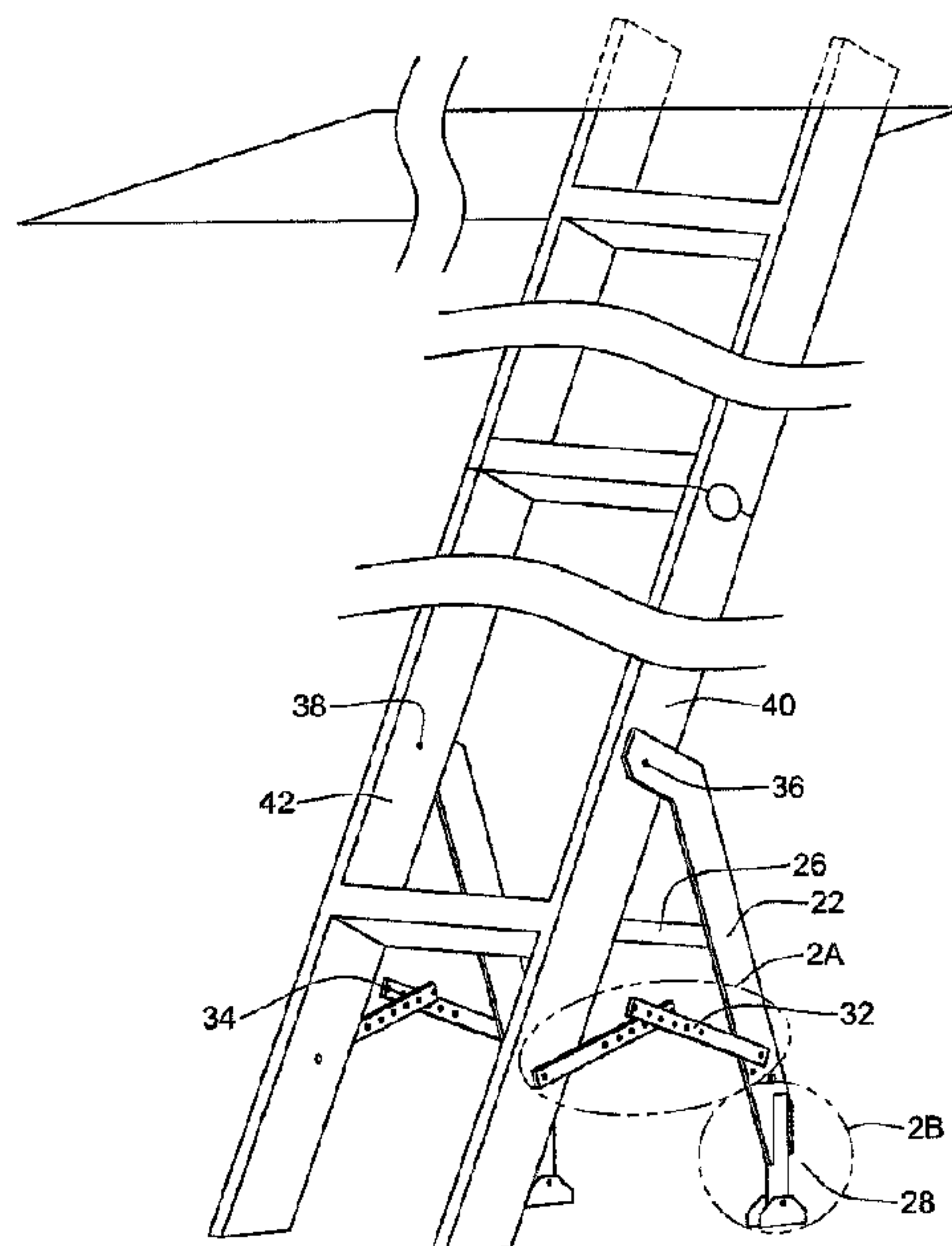
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(54) Titre : ECHELLE SURE PLIABLE
(54) Title: COLLAPSIBLE SAFE LADDER



(57) Abrégé/Abstract:

A ladder system is disclosed which allows for stabilizing a ladder, on multiple surfaces, without the need for a second person or a great deal of setup time. The collapsible ladder system includes a larger ladder section and a smaller ladder strut section that is pivotally connected at a point which is at or below the midpoint of the larger ladder section. The larger ladder section and smaller ladder strut section are connected by a rigid adjustable linkage, or spreader, at a point that is below the pivotable connection. The ladder further includes a means for stability on a variety of surfaces. At the ground contacting point, the point where the ladder side rail ends and the ground meet, there are adjustable gripping feet, which can be independently or in combination vertically or angularly adjusted for maximum stability.

ABSTRACT

A ladder system is disclosed which allows for stabilizing a ladder, on multiple surfaces, without the need for a second person or a great deal of setup time. The collapsible ladder system includes a larger ladder section and a smaller ladder strut section that is pivotally connected at a point which is at or below the midpoint of the larger ladder section. The larger ladder section and smaller ladder strut section are connected by a rigid adjustable linkage, or spreader, at a point that is below the pivotable connection. The ladder further includes a means for stability on a variety of surfaces. At the ground contacting point, the point where the ladder side rail ends and the ground meet, there are adjustable gripping feet, which can be independently or in combination vertically or angularly adjusted for maximum stability.

TITLE OF THE INVENTION**COLLAPSIBLE SAFE LADDER**

[0001] This application is a division of Application Serial Number 2,757,304 filed internationally on April 1, 2010 and entered into the National Phase in Canada on September 29, 2011.

FIELD OF THE INVENTION

[0002] The invention related to ladders, and in particular collapsible ladders.

BACKGROUND OF THE INVENTION

[0003] Ladders have the problem that when in use, they are generally unstable. This lack of stability will often lead to injury or even death. Indeed, injuries related to ladder use are a leading problem in construction, repair and other industries. Until now, the most common way to remedy an unstable ladder is to require a second person to be positioned at the base of the ladder, or to construct a form of scaffolding, which is both costly and time-consuming.

[0004] Accordingly, there is a need for a collapsible multi-surface, self-supporting ladder with an increased stability that does not require a second person or unnecessary assembly time. One aspect of the present disclosure is to provide a configuration that will help prevent injuries for individuals who climb, work on, dismount from, or do any other work with a ladder. It is contemplated that the exemplary embodiments disclosed below can be used on, inter alia, an extension ladder, pull-down attic ladder, one-piece straight ladder or any other ladder where additional stability is needed.

SUMMARY

[0005] According to one exemplary embodiment, the collapsible ladder assembly system includes a larger ladder section and a smaller strut section, wherein the smaller strut

ends are pivotally connected to the larger ladder section at a point that is at or below the midpoint of the larger ladder section, therefore allowing the system to be collapsible. The larger ladder section and smaller strut section are further connected by a rigid adjustable linkage, or spreader, at points that are below the pivotable connection that are capable of adding further stability and maintaining a consistent predetermined angle or distance between the feet of the larger ladder and the smaller strut section.

[0006] According to another exemplary embodiment, the collapsible ladder assembly system includes a pre-existing larger ladder section and a smaller strut section, wherein the smaller strut ends are detachably and pivotally connected to the pre-existing larger ladder section at a point that is at or below the midpoint of the larger ladder section, therefore allowing the system to be collapsible and/or detachable. The larger ladder and smaller strut sections are connected by a rigid adjustable linkage, or spreader, at points that are below the pivotable connection. These linkage connections can be detachable at the pre-existing large ladder end and permanent at the smaller strut section, or a variation thereof.

[0007] The exemplary ladder configurations disclosed herein provide a means for stability on multiple surfaces. At the ground contacting point, the point where the rail or strut ends meet the ground, there are adjustable gripping feet or shoes, which can be independently or in combination vertically or angularly adjusted for maximum stability.

[0007a] According to another exemplary embodiment, an apparatus for stabilizing a ladder, the ladder having first and second substantially parallel side rails, each side rail having an inner surface, an outer surface defining a surface plane, a base end, an upper end and at least two ladder rungs connecting the inner surface of the first side rail to the inner surface of the second side rail and disposed to lie generally perpendicular to said first and

second substantially parallel side rails, the apparatus comprising: (i) first and second substantially parallel support rails adapted for pivotal connection to said first and second substantially parallel side rails; wherein each of said first and second substantially parallel support rails is a continuous length of material having a first end, a second end, and two substantially linear portions positioned therebetween; wherein said two substantially linear portions are positioned in substantially the same plane at an obtuse angle relative to one another to form each of said first and second substantially parallel support rails; wherein the side rail's length is at least double that of the support rail's length; (ii) one or more longitudinal cross members connecting said first and second substantially parallel support rails; (iii) one or more pivotable connectors for adjoining (a) the first end of the first substantially parallel support rail to the outer surface of the first side rail at a point between the base end and the midpoint of said substantially parallel side rail's length and (b) the first end of the second substantially parallel support rail to the outer surface of the second side rail at a point between the base end and the midpoint of the substantially parallel side rail's length; wherein the second end of said first substantially parallel support rail selectively deploys from the base end of the first substantially parallel side rail, said first substantially parallel support rail selectively deploying in a plane that is substantially parallel to the first substantially parallel side rail's surface plane; wherein the second end of said second substantially parallel support rail selectively deploys from the base end of the second substantially parallel side rail, said second substantially parallel support rail selectively deploying in a plane that is substantially parallel to the second substantially parallel side rail's surface plane; (iv) a spreader having a first end and a second end, wherein the first end is connected to a substantially parallel support rail and the second end is configured to be connected to a substantially parallel side rail; and (v)

an adjustable shaft at the second end of each support rail, wherein each shaft has a shoe at the ground contact point.

[0007b] According to another exemplary embodiment, a method for stabilizing a ladder, the ladder having first and second substantially parallel side rails, each of said first and second substantially parallel side rails having an inner surface, an outer surface defining a surface plane, a base end, an upper end and at least two ladder rungs connecting the inner surface of the first side rail to the inner surface of the second side rail and disposed to lie generally perpendicular to said first and second substantially parallel side rails, the method comprising: connecting a first support rail with a second support rail using one or more longitudinal cross members such that the first support rail and the second support rail are substantially parallel; wherein each of said first and second substantially parallel support rails is a continuous length of material having a first end, a second end, and two substantially linear portions positioned therebetween; wherein said two substantially linear portions are positioned to lie in substantially the same plane at an obtuse angle relative to one another to form each of said first and second substantially parallel support rails; wherein the side rail's length is at least double that of the support rail's length; pivotally connecting (a) the first end of the first substantially parallel support rail to the outer surface of the first side rail at a point between the base end and the midpoint of the substantially parallel side rail's length and (b) the first end of the second substantially parallel support rail to the outer surface of the second side rail at a point between the base end and the midpoint of the substantially parallel side rail's length; wherein the second end of said first substantially parallel support rail selectively deploys from the base end of the first substantially parallel side rail, said first substantially parallel support rail selectively deploying in a plane that is substantially parallel to the first

substantially parallel side rail's surface plane; wherein the second end of said second substantially parallel support rail selectively deploys from the base end of the second substantially parallel side rail, said second substantially parallel support rail selectively deploying in a plane that is substantially parallel to the second substantially parallel side rail's surface plane; and connecting one or more spreaders between said substantially parallel support rails and to a substantially parallel side rail.

[0007c] According to another exemplary embodiment, a ladder system, comprising:

(i) first and second substantially parallel support rails adapted for pivotal connection to first and second parallel side rails, each of said first and second parallel side rails having an inner surface, an outer surface defining a surface plane, a base end, and an upper end; wherein each of said first and second substantially parallel support rails is a continuous length of material having a first end, a second end, and two substantially linear portions positioned therebetween; wherein said two substantially linear portions are positioned in substantially the same plane at an obtuse angle relative to one another to form each of said first and second substantially parallel support rails; wherein the side rail's length is at least double that of the support rail's length; (ii) one or more longitudinal cross members disposed between said substantially parallel support rails; (iii) one or more connectors for pivotally adjoining the first end of the first support rail to the outer surface of the first side rail at a point between the base end and the midpoint of the side rail's length and the first end of the second support rail to the outer surface of the second side rail at a point between the base end and the midpoint of the side rail's length; wherein the second end of said first substantially parallel support rail selectively deploys from the base end of the first substantially parallel side rail, said first substantially parallel support rail selectively deploying in a plane that is substantially parallel to the first substantially parallel side

rail's surface plane; wherein the second end of said second substantially parallel support rail selectively deploys from the base end of the second substantially parallel side rail, said second substantially parallel support rail selectively deploying in a plane that is substantially parallel to the second substantially parallel side rail's surface plane; (iv) a spreader having a first end and a second end, wherein the first end is connected to a substantially parallel support rail and the second end is configured to be connected to a substantially parallel side rail; and (v) an adjustable shaft at the second end of each substantially parallel support rail, wherein the adjustable shaft includes a shoe at the ground contact point.

DESCRIPTION OF THE DRAWINGS

[0008] These and other advantages of the present invention will be readily understood with reference to the following specification and attached drawing wherein:

[0009] FIG. 1 is a front angular perspective view of a first embodiment of a ladder system of the present invention mounted on a pull-down ladder in the collapsed position;

[0010] FIG. 2 is a front angular perspective view of the first embodiment of a ladder system of the present invention mounted on a pull-down attic ladder in the extended position;

[0011] FIG. 2A is an exploded view of the adjustable spreader of the ladder system in FIG. 2;

[0012] FIG. 2B is an exploded view of the adjustable foot of the ladder system in FIG. 2;

[0013] FIG. 3 is a side angular perspective view of a second embodiment of the adjustable ladder system of the present invention mounted on an extension ladder;

[0014] FIG. 3A is an exploded view of the adjustable spreader of the ladder system in FIG. 3;

[0015] FIG. 3B is an exploded view of the adjustable foot of the ladder system in FIG. 3;

[0016] FIG. 4 is a side angular perspective view of a second embodiment of the adjustable ladder system of the present invention mounted on an extension ladder set up to allow for a greater ground footprint;

[0017] FIG. 4A is an exploded view of the adjustable spreader of the ladder system in FIG. 4;

[0018] FIG. 4B is an exploded view of the adjustable foot of the ladder system in FIG. 4;

[0019] FIG. 5 is a side angular perspective view of a second embodiment of the adjustable ladder system of the present invention mounted on an extension ladder set up to allow for a maximum ground footprint;

[0020] FIG. 5A is an exploded view of the fully extended adjustable spreader of the ladder system in FIG. 5;

[0021] FIG. 5B is an exploded view of the adjustable foot of the ladder system in FIG. 5;

[0022] FIG. 6 is an exploded view of a partially extended adjustable spreader of the ladder system;

[0023] FIG. 7 is a side view of the ladder system showing the spreader in a locked extended position;

[0024] FIG. 8 shows an alternative foot with a rubber boot;

[0025] FIG. 9 shows an alternative foot where the shaft forms a spike; and

[0026] FIG. 10 shows the safety latch mechanism.

DETAILED DESCRIPTION

[0027] Referring to FIG. 1, an embodiment of the ladder system **20** mounted to pull-down ladder **10** in a partially collapsed state is depicted. The ladder system **20**, or smaller strut section, includes a pair of rails **22, 24** substantially identical but of opposite hand, a lateral cross member strut **26**, a pair of adjustable feet **28, 30** substantially identical but of opposite hand, and a pair of rigid adjustable spreaders **32, 34** substantially identical but of opposite hand.

[0028] Referring now to FIG. 2, the ladder system of FIG. 1 is shown fully extended. In this embodiment, the rails **22, 24** are substantially parallel, however in an alternative embodiment the rails **22, 24** may be outwardly flared at their lower ends to create a wider stance, allowing for increased stability. In either embodiment, each of the rails **22, 24** has a foot **28, 30** located at the end of the rail **22, 24** where contact is made with the ground, referred to as the ground contacting point, while the opposite end of each of the rail **22, 24** is pivotally connected, using pivotal connectors **36, 38**, to its respective rails **40, 42** of the pull-down ladder **10**. The pivotal connections **36, 38** can be

either permanently connected by means of a bolt, rivet, pivoting hinge, etc., or alternatively, the pivotal connection can be removably attached to the rails **40, 42** of the pull-down ladder **10** by means of a clamping structure, allowing the ladder system to be used on a multitude of preexisting ladders.

[0029] Referring to FIG. 2A, an exploded view of an adjustable spreader of the ladder system, the depicted rigid adjustable spreader **32, 34** is generally composed of two rigid spans **32A, 32B** that are pivotally connected at their ends with a shank **33a** and lock pin **33b** such that the two rigid spans **32A, 32B** can lock in the fully extended position between the rails **22, 24** in the lower section, between the midpoint of the ladder rail length and the ground contact points, of their respective rails **40, 42** of the pull-down ladder **10**. The pivotal connection is laterally adjustable such that the length of the spreader can be increased or decreased thereby increasing or decreasing the angle created between the ladder system rails **22, 24** and their respective rails **40, 42** of the pull-down ladder **10**.

[0030] Referring to FIG 7, another means for connecting two rigid spans **32A, 32B** is shown. The two rigid spans **32A, 32B** are connected to one another at two points with a permanent laterally slideable connection and a second connection that locks the span at the specified length using the safety stop **84** and a pin **33A** that penetrates the hole of the safety stop **84** and the desired hole in the rigid span **32B** therefore locking the overall length of the spreaders **32, 34**. When the pin **33A** is not in the safety stop **84**, the spreader can be folded at the slideable connection. To prevent misplacement, the pin **33A** may be tethered to the ladder or ladder system **20**. In an alternative embodiment, there may be more than two rigid spans comprising the spreader, and the connection between the at least two rigid spans can be by another means, including, but not limited to, a threaded post and wing nut or screw caps **50**.

[0031] Referring to FIG. 2B, an exploded view of a ladder system foot **28** is shown. The feet **28, 30**, located at the end of the rails **22, 24** at the ground contact point, are both angularly and vertically adjustable. Each of said feet **28, 30** is composed of two primary components, a vertically extendable shaft **44** and shoe **46** pivotally connected to the shaft **44** using a pivotal connector **48**. The pivotal connector **48** allows the shoe **46** to conform to angle of the ground on which it is placed. If required, the pivotal connector **48** can be tightened, therefore locking the shoe **46** in the preferred arrangement.

[0032] The underside of the shoe **46** includes a gripping means **62** to minimize slippage at the ground contact point. Depending on the application, said gripping means **62** could be a rubber pad for use on a relatively smooth hard surface, spiked (as seen in FIG. 9) or staggered for use on grass and packed dirt, or even a planar foot that creates a large shoe surface area, therefore preventing the foot **28, 30** from sinking into soft ground. Depending on the choice of shoe **46**, the ladder system **20** can be used on ground surfaces such as concrete, dirt, steel, tile, grating, brick, stone and most floor materials. The pivotable connector **48** between the shaft **44** and shoe **46** may be permanent or removable, therefore allowing one to interchange the shoe **46** depending on the application or environment.

[0033] Alternative foot embodiments are shown in FIG 7 wherein the shoe **46** is directly coupled to the end of the rails **22, 24** and FIG. 8 wherein the shaft **44** comes into direct contact with the ground or through an optional intermediate such as a rubber boot **80**. The rubber boot **80** acts as a gripping means and prevents the shaft **44** from scratching the ground. Referring now to FIG. 9, in lieu of a rubber boot **80**, the end of the shaft **44** may be pointed to increase ground penetration, therefore preventing slippage on dense penetratable surfaces such as dirt, grass, gravel and rock.

[0034] Referring now to FIGS. 3 – 5, in this embodiment, a side view of the ladder system's versatility is shown when the ladder system 20 is installed on a traditional straight ladder 60; however, the system is not restricted to a straight ladder but can be applied to any ladder where additional stability is required. FIGS. 3 – 5 show three adjustment configurations where the rigid adjustable spreaders 32, 34 have been laterally adjusted to create a larger overall footprint by increasing the distance between the larger ladder section 60 and the ladder system 20, the shaft 44 is vertically adjusted to ensure that steady contact between the shoe 46 and the ground is maintained, and the shoe 46 adapts to the angle and terrain of the ground. The shaft 44 as shown in FIGS. 3B, 4B and 5B is adjusted using two nested tubes 56, 58 with a plurality of holes 52 which, when adjusted to the appropriate height, can be aligned and locked into place using a set pin 54. In alternative embodiments, a push-button adjustment mechanism with or without a locking ring may be used to secure the two nested tubes 56, 58, the nested tubes 56, 58 may be locked at a specified length with a slip nut and washer, or the two nested tubes 56, 58 may be threadedly coupled wherein the overall shaft 44 is extended or shortened by rotating the shoe 46 and/or lower nested tube 56.

[0035] Referring to FIG. 10, the ladder system may be locked in the closed position using the safety latch 82, which locks the ladder system 20 to the ladder being stabilized. The safety latch can be used with a plurality of ladders, including but not limited to pull-down ladders, straight ladders and extension ladders. FIG. 10 shows the safety latch 82 attached to the lateral cross member strut 26, however in another embodiment, the safety latch 82 may attach to a loop or other latch receptacle.

[0036] The ladder system 20 structure as described can be constructed from any material known in the art of ladder fabrication, including but not limited to wood, metal, metal alloys, fiberglass, composites, carbon fiber, plastic or a combination thereof.

Similarly, the rails of the smaller strut section, or ladder system **20** need not be the same material as the larger ladder section.

[0037] Obviously, many modifications and variations of the present invention are possible in light of the above teachings. Thus, it is to be understood that the invention may be practiced otherwise than as specifically described above.

WHAT IS CLAIMED IS:

1. An apparatus for stabilizing a ladder, the ladder having first and second substantially parallel side rails, each side rail having an inner surface, an outer surface defining a surface plane, a base end, an upper end and at least two ladder rungs connecting the inner surface of the first side rail to the inner surface of the second side rail and disposed to lie generally perpendicular to said first and second substantially parallel side rails, the apparatus comprising:
 - (i) first and second substantially parallel support rails adapted for pivotal connection to said first and second substantially parallel side rails;

wherein each of said first and second substantially parallel support rails is a continuous length of material having a first end, a second end, and two substantially linear portions positioned therebetween;

wherein said two substantially linear portions are positioned in substantially the same plane at an obtuse angle relative to one another to form each of said first and second substantially parallel support rails;

wherein the side rail's length is at least double that of the support rail's length;
 - (ii) one or more longitudinal cross members connecting said first and second substantially parallel support rails;
 - (iii) one or more pivotable connectors for adjoining (a) the first end of the first substantially parallel support rail to the outer surface of the first side rail at a point between the base end and the midpoint of said substantially parallel side rail's length and (b) the first end of the second substantially parallel support rail to the outer surface of the second side rail at a point between the base end and the midpoint of the substantially parallel side rail's length;

- wherein the second end of said first substantially parallel support rail selectively deploys from the base end of the first substantially parallel side rail, said first substantially parallel support rail selectively deploying in a plane that is substantially parallel to the first substantially parallel side rail's surface plane;
- wherein the second end of said second substantially parallel support rail selectively deploys from the base end of the second substantially parallel side rail, said second substantially parallel support rail selectively deploying in a plane that is substantially parallel to the second substantially parallel side rail's surface plane;
- (iv) a spreader having a first end and a second end, wherein the first end is connected to a substantially parallel support rail and the second end is configured to be connected to a substantially parallel side rail; and
- (v) an adjustable shaft at the second end of each support rail, wherein each shaft has a shoe at the ground contact point.
2. The apparatus of claim 1, wherein the adjustable shaft comprises an upper nested tube having a series of angled notches configured to receive one or more pegs, a lower nested tube having one or more pegs capable of being received by the angled notches, and a spring housed within a hollow space of the nested tubes enabled to pull at least one peg into the one or more angled notches.
3. The apparatus of claim 1, wherein a primary material of the apparatus is a metal or metal alloy.
4. The apparatus of claim 1 wherein a primary material is a fiberglass or a composite.
5. The apparatus of claim 1 wherein a primary material is a wood or wood composite.

6. The apparatus of claim 1, wherein each shoe has a gripping material to prevent slippage at the ground contact point.
7. The apparatus of claim 1, further comprising a kick peg.
8. The apparatus of claim 1, wherein the first and second substantially parallel support rails are removably connected to said first and second substantially parallel side rails.
9. The apparatus of claim 8, wherein the ladder is a preexisting ladder, whereby the first and second substantially parallel support rails are removably connected without requiring structural modifications to the preexisting ladder.
10. A method for stabilizing a ladder, the ladder having first and second substantially parallel side rails, each of said first and second substantially parallel side rails having an inner surface, an outer surface defining a surface plane, a base end, an upper end and at least two ladder rungs connecting the inner surface of the first side rail to the inner surface of the second side rail and disposed to lie generally perpendicular to said first and second substantially parallel side rails, the method comprising:
 - connecting a first support rail with a second support rail using one or more longitudinal cross members such that the first support rail and the second support rail are substantially parallel;
 - wherein each of said first and second substantially parallel support rails is a continuous length of material having a first end, a second end, and two substantially linear portions positioned therebetween;

wherein said two substantially linear portions are positioned to lie in substantially the same plane at an obtuse angle relative to one another to form each of said first and second substantially parallel support rails;

wherein the side rail's length is at least double that of the support rail's length;

pivotally connecting (a) the first end of the first substantially parallel support rail to the outer surface of the first side rail at a point between the base end and the midpoint of the substantially parallel side rail's length and (b) the first end of the second substantially parallel support rail to the outer surface of the second side rail at a point between the base end and the midpoint of the substantially parallel side rail's length;

wherein the second end of said first substantially parallel support rail selectively deploys from the base end of the first substantially parallel side rail, said first substantially parallel support rail selectively deploying in a plane that is substantially parallel to the first substantially parallel side rail's surface plane;

wherein the second end of said second substantially parallel support rail selectively deploys from the base end of the second substantially parallel side rail, said second substantially parallel support rail selectively deploying in a plane that is substantially parallel to the second substantially parallel side rail's surface plane; and

connecting one or more spreaders between said substantially parallel support rails and to a substantially parallel side rail.

11. The method of claim 10, wherein said ladder further comprises an adjustable shaft comprising an upper nested tube having a series of angled notches configured to receive one or more pegs, a lower nested tube having one or more pegs capable of being received by the angled notches, and a spring housed within a hollow space of the nested tubes enabled to pull at least one peg into the one or more angled notches.

12. The method of claim 11, further comprising the step of pulling the spring to a desired height and twisting the spring thereby causing at least one peg to be inserted into at least one of the angled notches.
13. The method of claim 10, wherein the first and second substantially parallel support rails are removably connected to said first and second substantially parallel side rails.
14. The method of claim 10, wherein the ladder is a preexisting ladder, whereby the first and second substantially parallel support rails are removably connected without requiring structural modifications to the preexisting ladder.
15. A ladder system, comprising:
 - (i) first and second substantially parallel support rails adapted for pivotal connection to first and second parallel side rails, each of said first and second parallel side rails having an inner surface, an outer surface defining a surface plane, a base end, and an upper end;

wherein each of said first and second substantially parallel support rails is a continuous length of material having a first end, a second end, and two substantially linear portions positioned therebetween;

wherein said two substantially linear portions are positioned in substantially the same plane at an obtuse angle relative to one another to form each of said first and second substantially parallel support rails;

wherein the side rail's length is at least double that of the support rail's length;
 - (ii) one or more longitudinal cross members disposed between said substantially parallel support rails;
 - (iii) one or more connectors for pivotally adjoining the first end of the first support rail to the outer surface of the first side rail at a point between the base end and the midpoint of

the side rail's length and the first end of the second support rail to the outer surface of the second side rail at a point between the base end and the midpoint of the side rail's length;

wherein the second end of said first substantially parallel support rail selectively deploys from the base end of the first substantially parallel side rail, said first substantially parallel support rail selectively deploying in a plane that is substantially parallel to the first substantially parallel side rail's surface plane; wherein the second end of said second substantially parallel support rail selectively deploys from the base end of the second substantially parallel side rail, said second substantially parallel support rail selectively deploying in a plane that is substantially parallel to the second substantially parallel side rail's surface plane;

- (iv) a spreader having a first end and a second end, wherein the first end is connected to a substantially parallel support rail and the second end is configured to be connected to a substantially parallel side rail; and
- (v) an adjustable shaft at the second end of each substantially parallel support rail, wherein the adjustable shaft includes a shoe at the ground contact point.

16. The ladder system of claim 15, wherein a primary material is a metal or metal alloy.

17. The ladder system of claim 15, wherein said shoe has a gripping material to prevent slippage at the ground contact point.

18. The ladder system of claim 17, wherein said shoe is adjustable, thereby enabling the shoe to conform to the angle of the ground.

19. The ladder system of claim 15, wherein the ladder is a preexisting ladder, whereby the first and second substantially parallel support rails are removably connected without requiring structural modifications to the preexisting ladder.

20. The ladder system of claim 15, wherein the first and second substantially parallel support rails are removably connected to said first and second substantially parallel side rails.

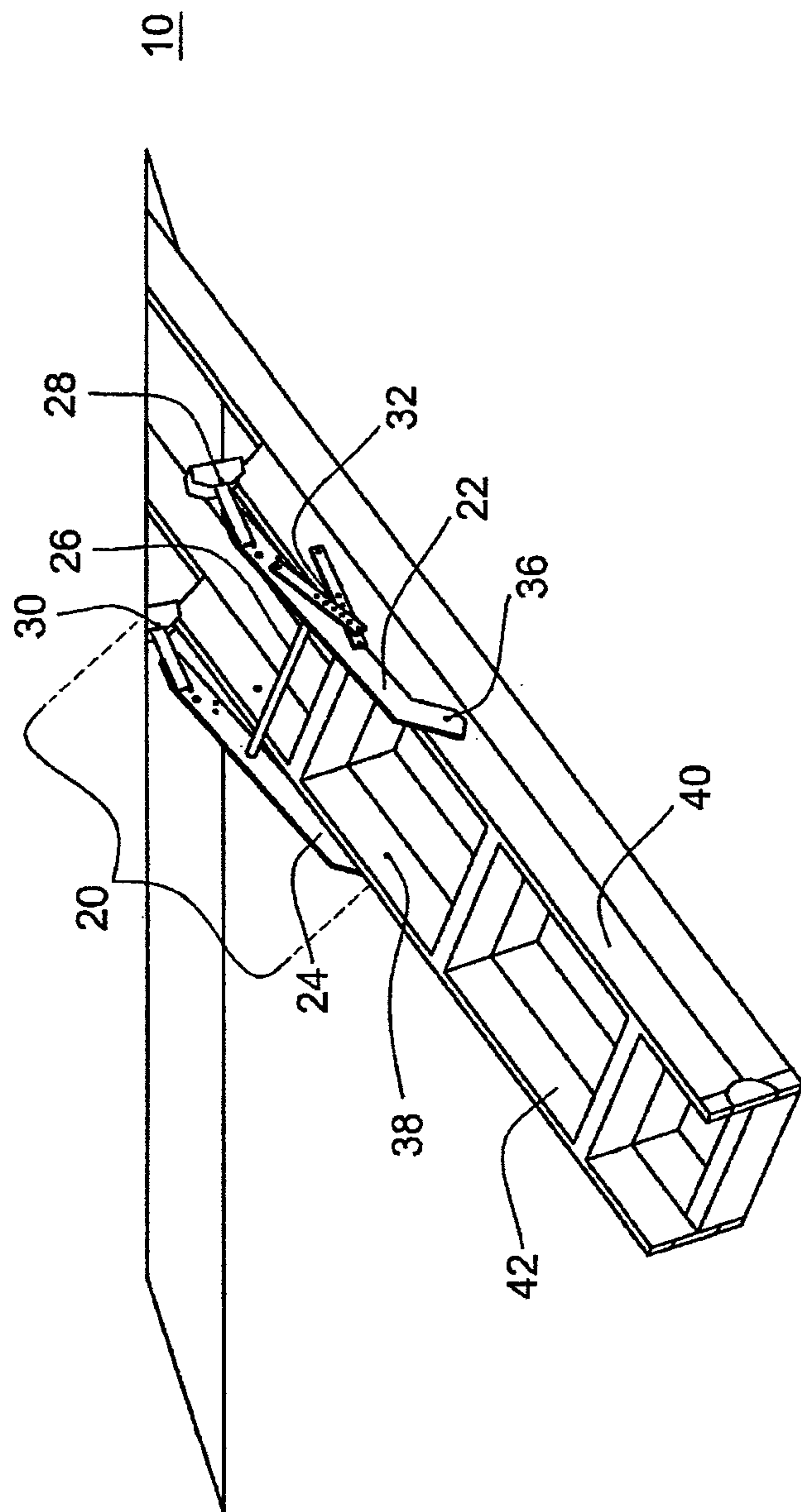


FIG. 1

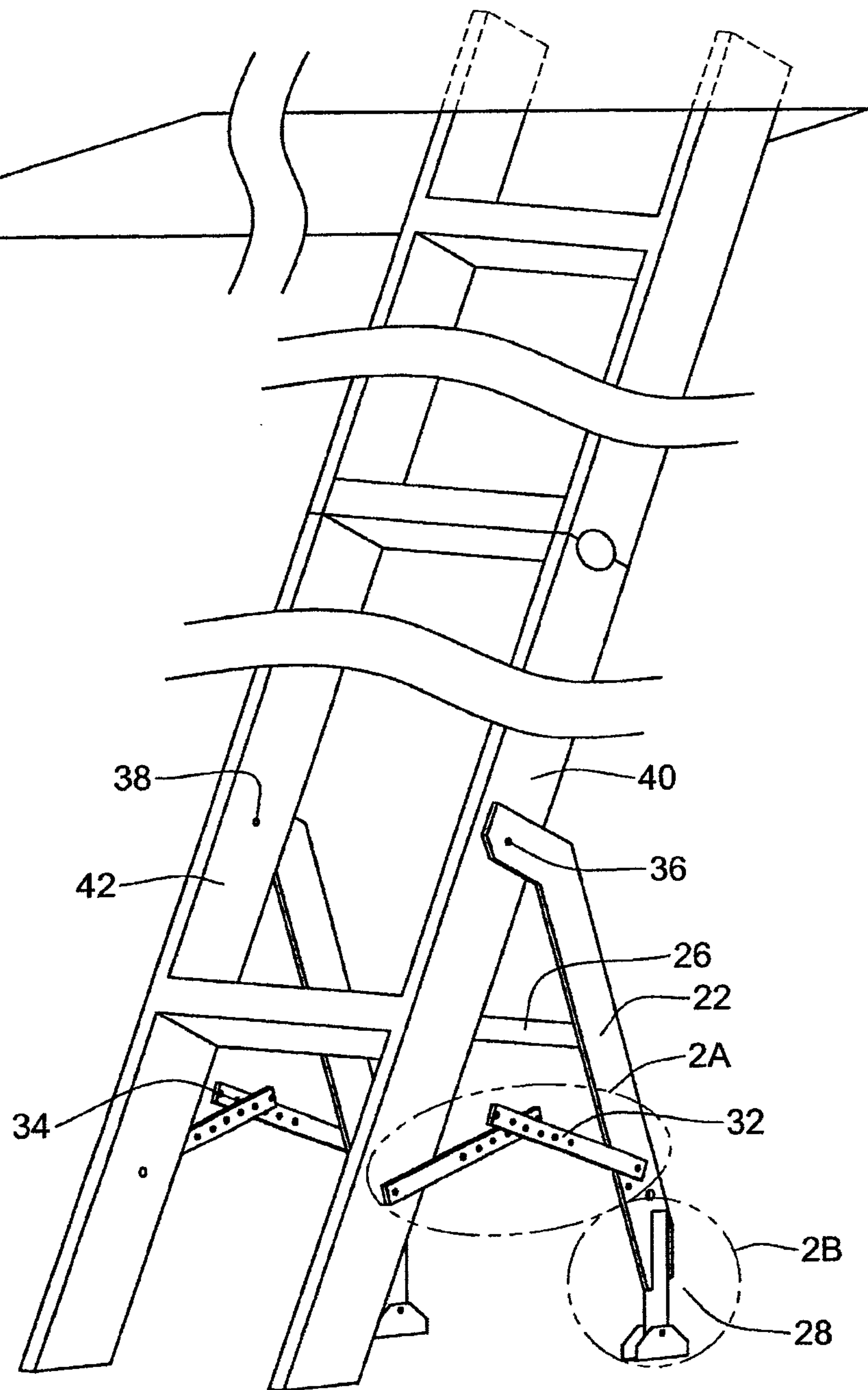


FIG. 2

3/8

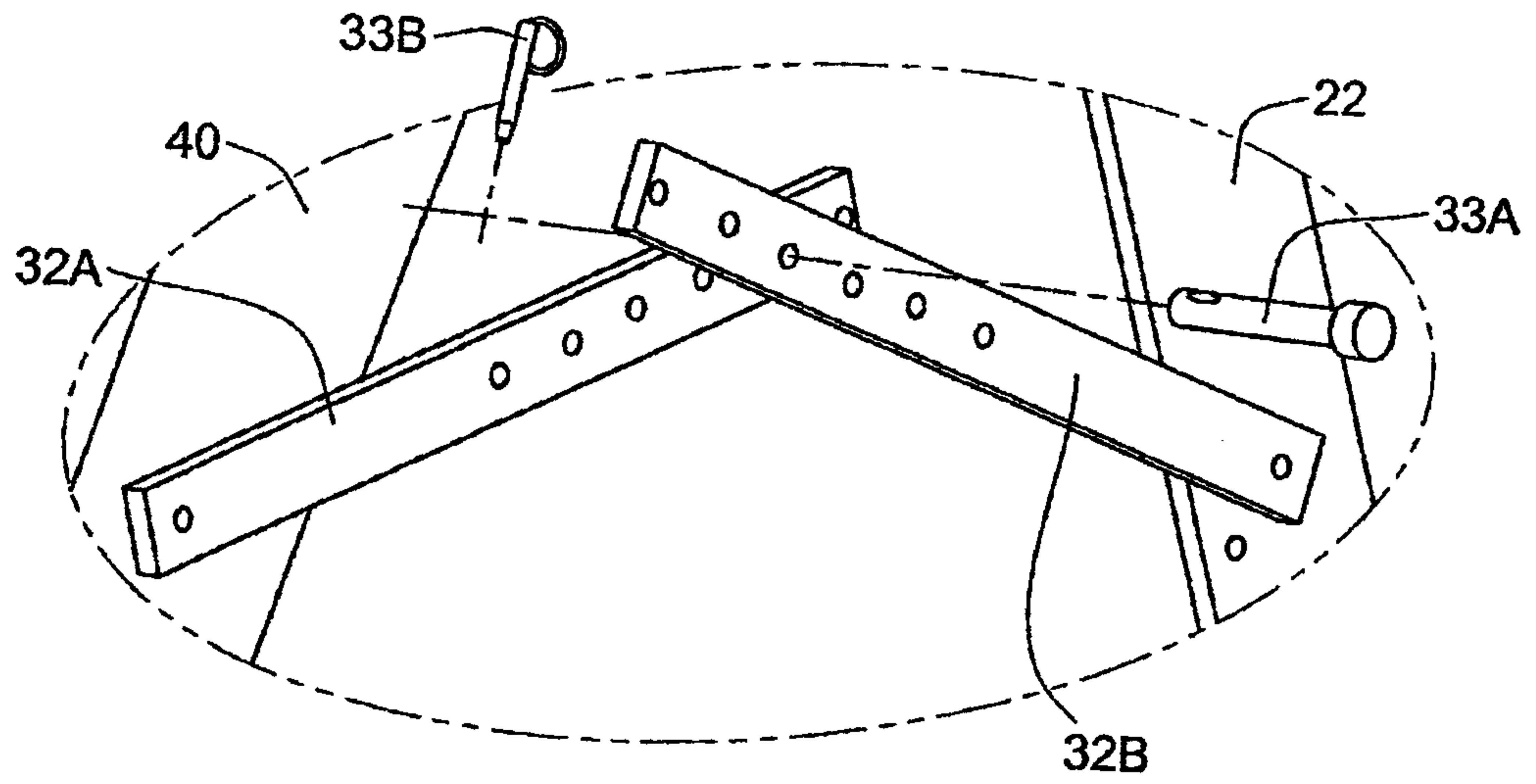


FIG. 2A

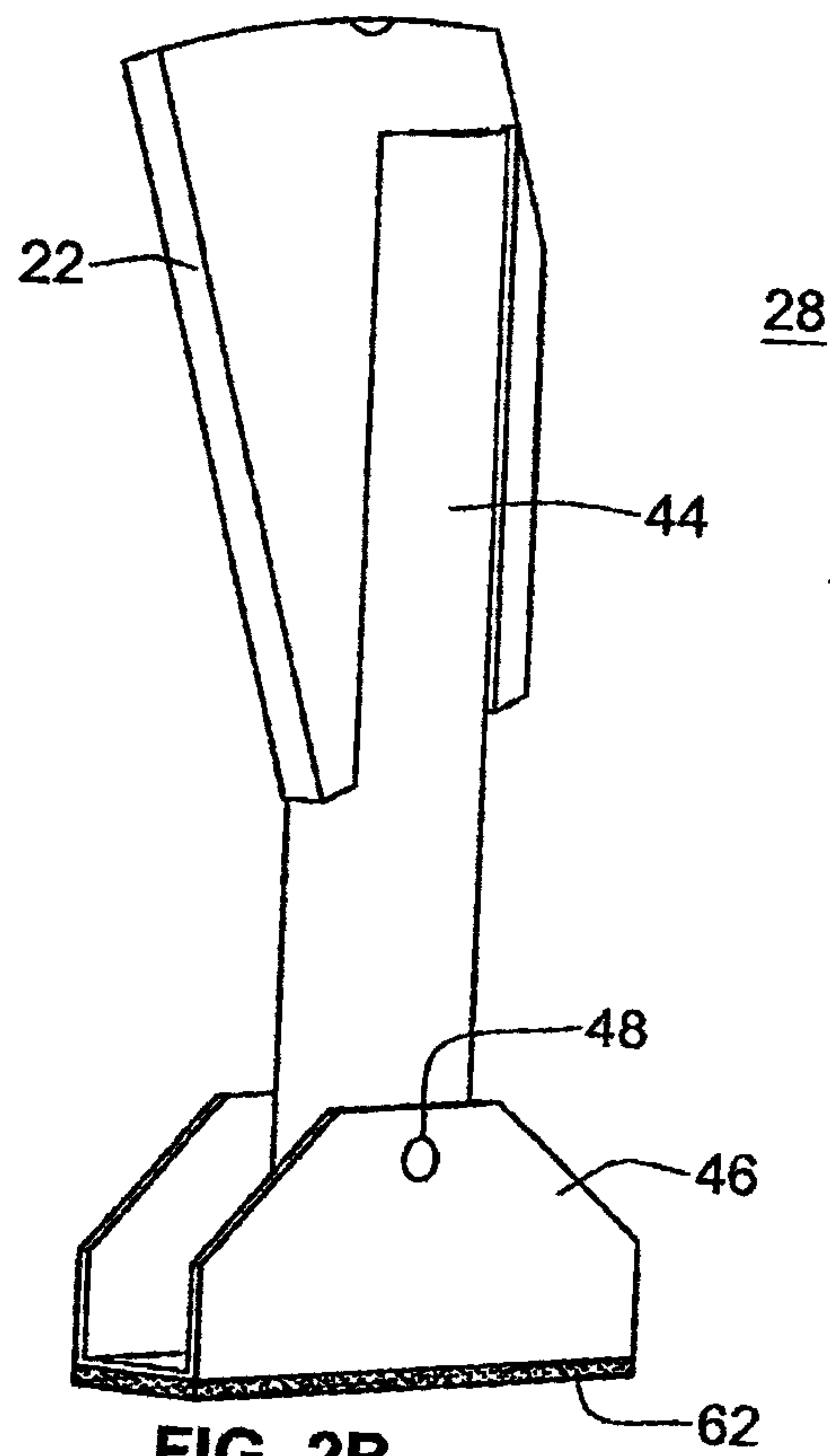


FIG. 2B

4/8

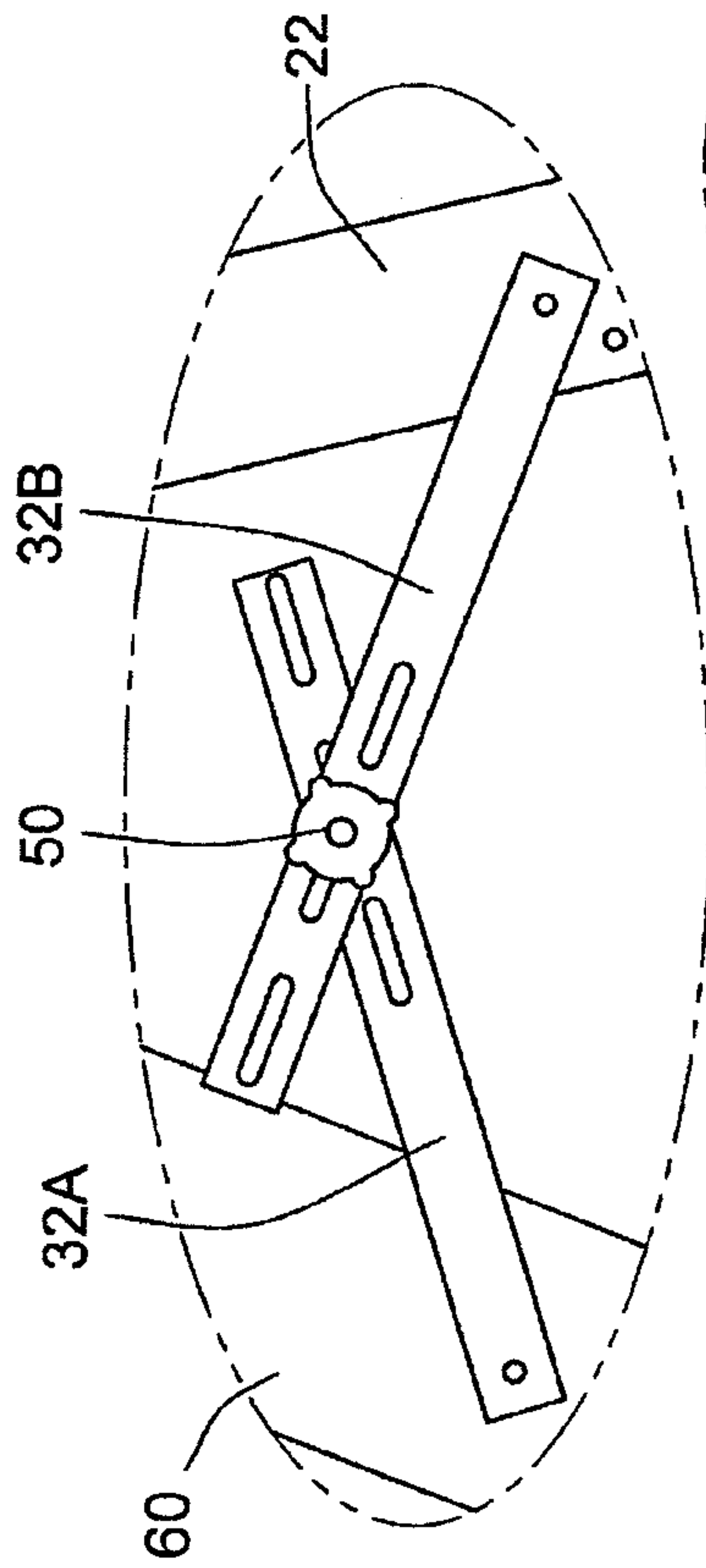


FIG. 3A

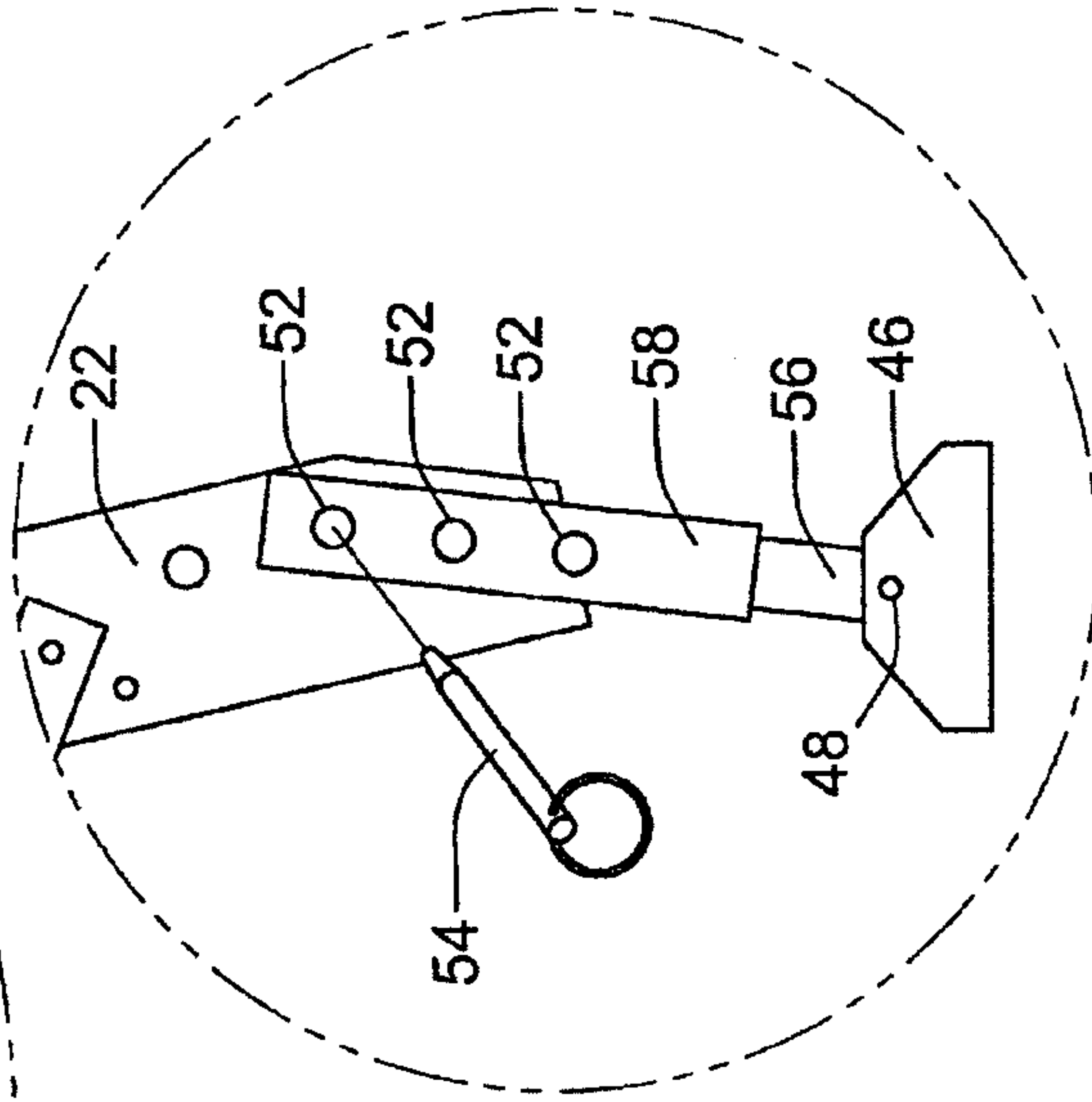


FIG. 3B

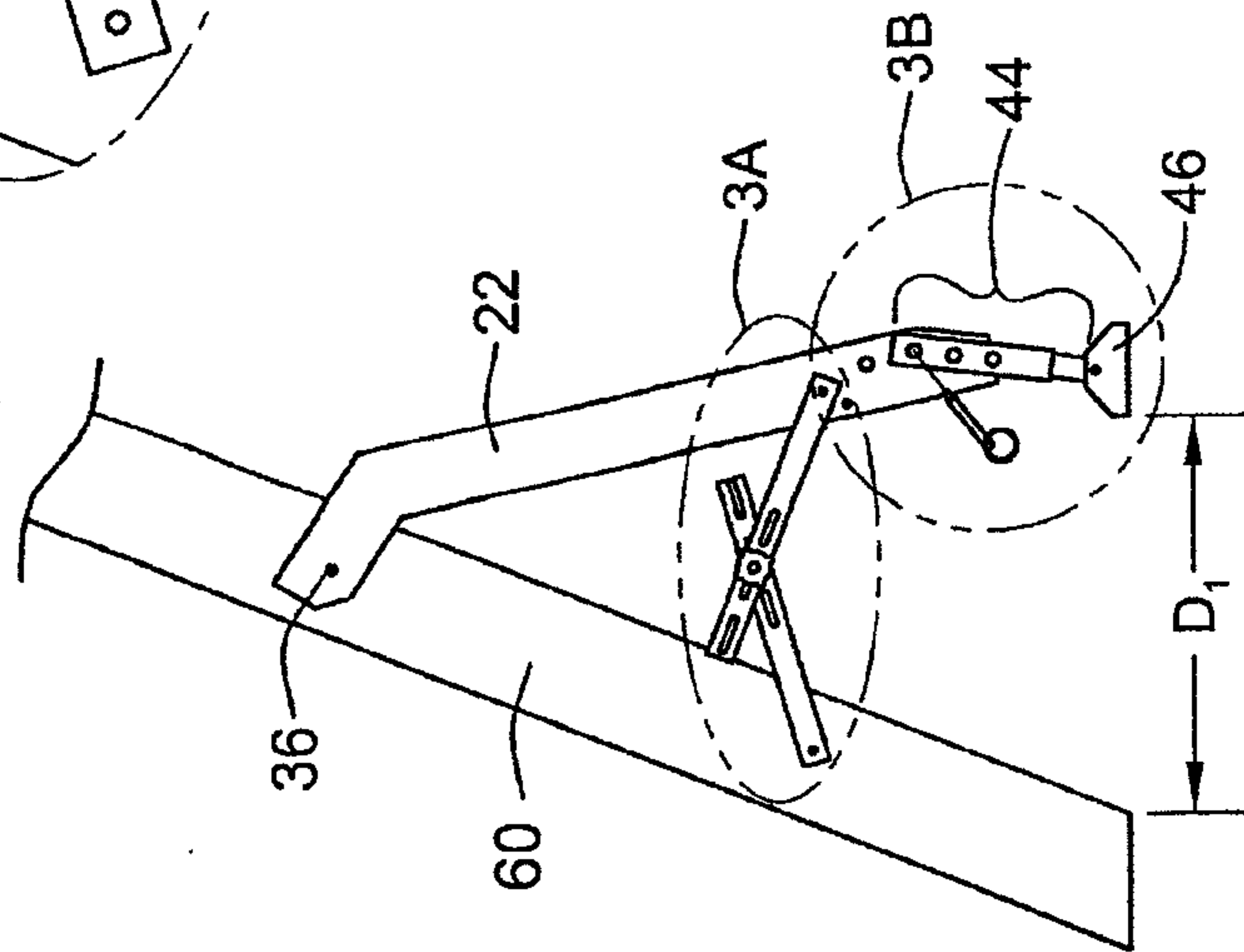
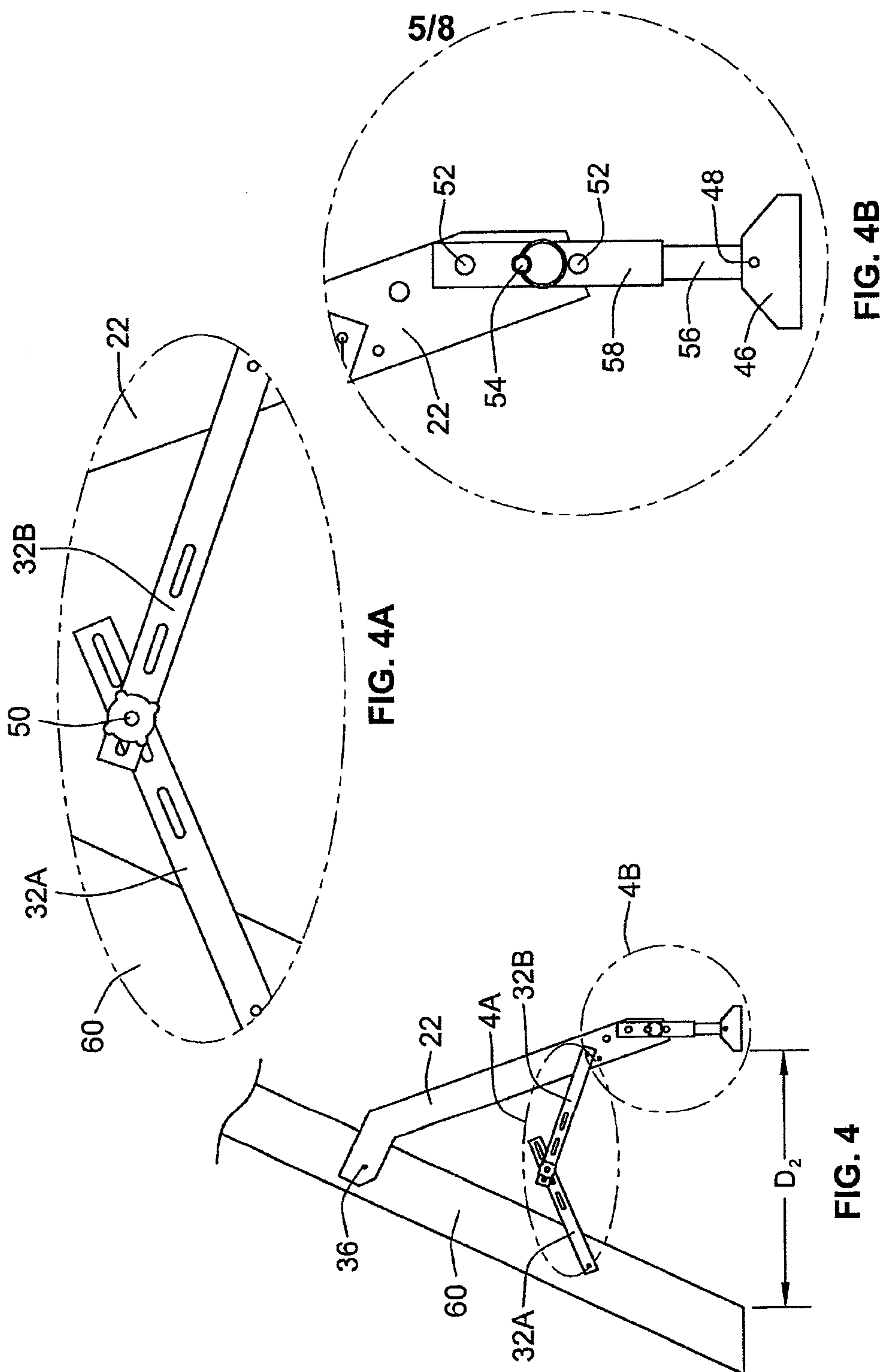


FIG. 3



6/8

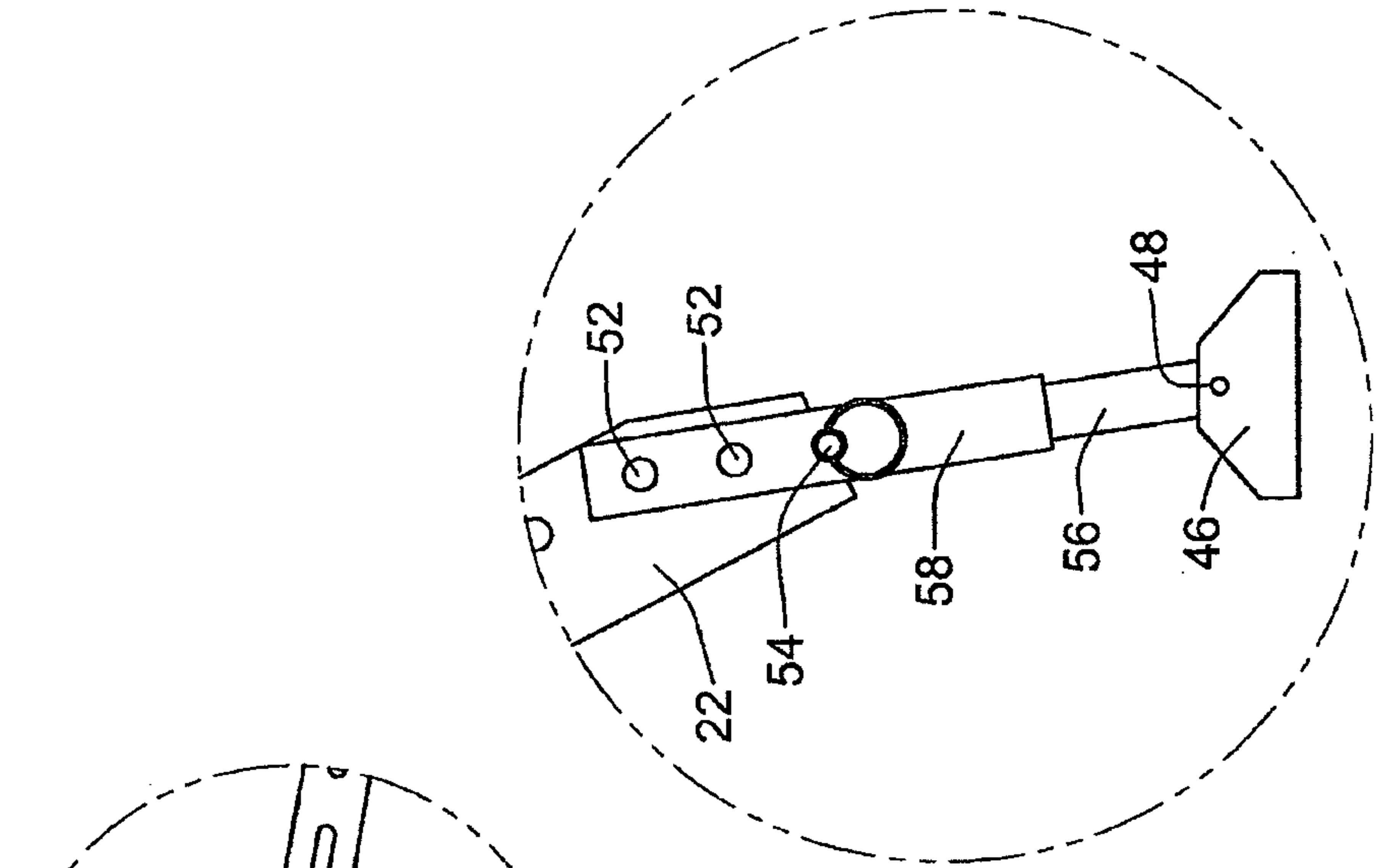


FIG. 5B

FIG. 5A

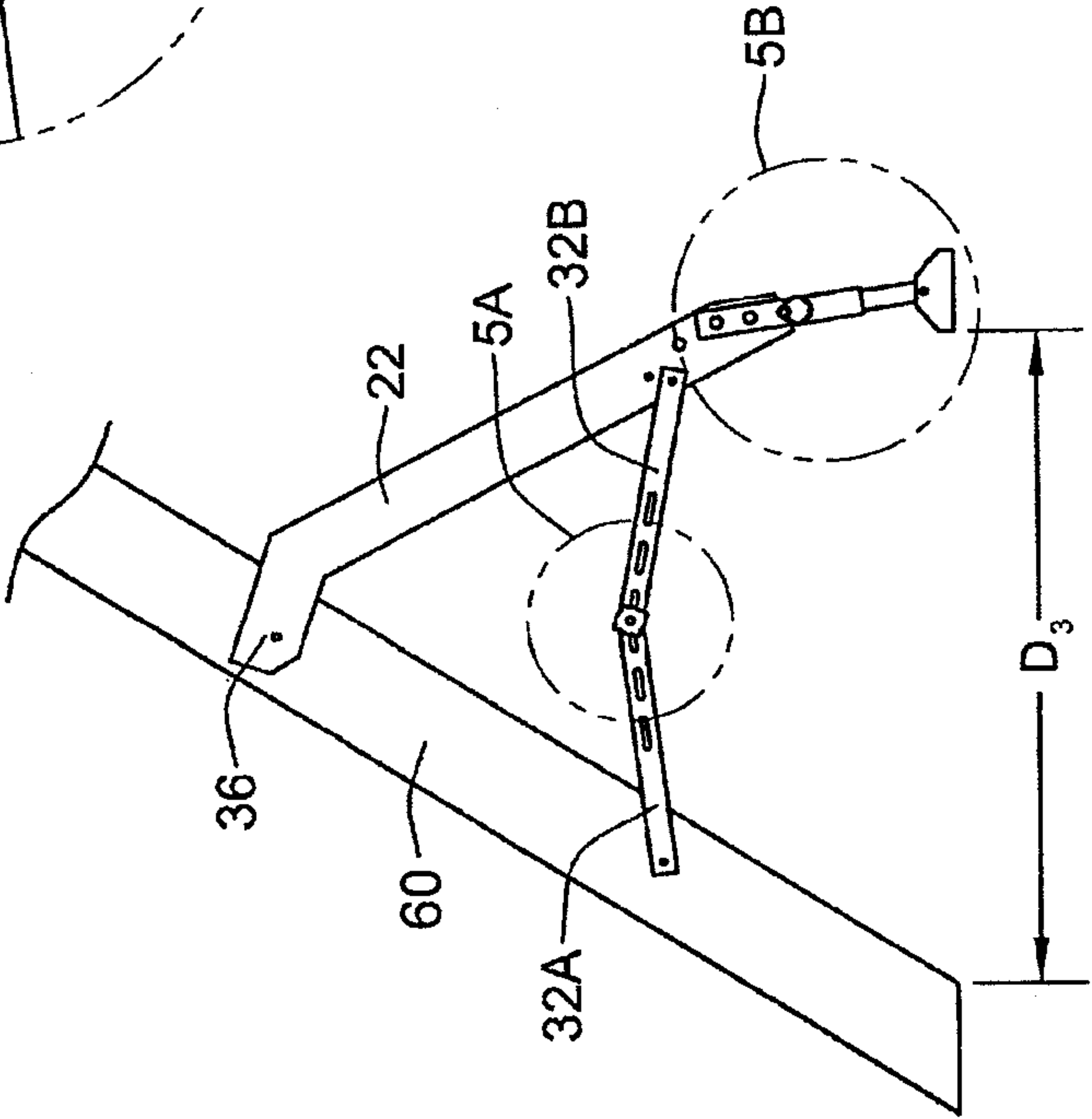


FIG. 5

7/8

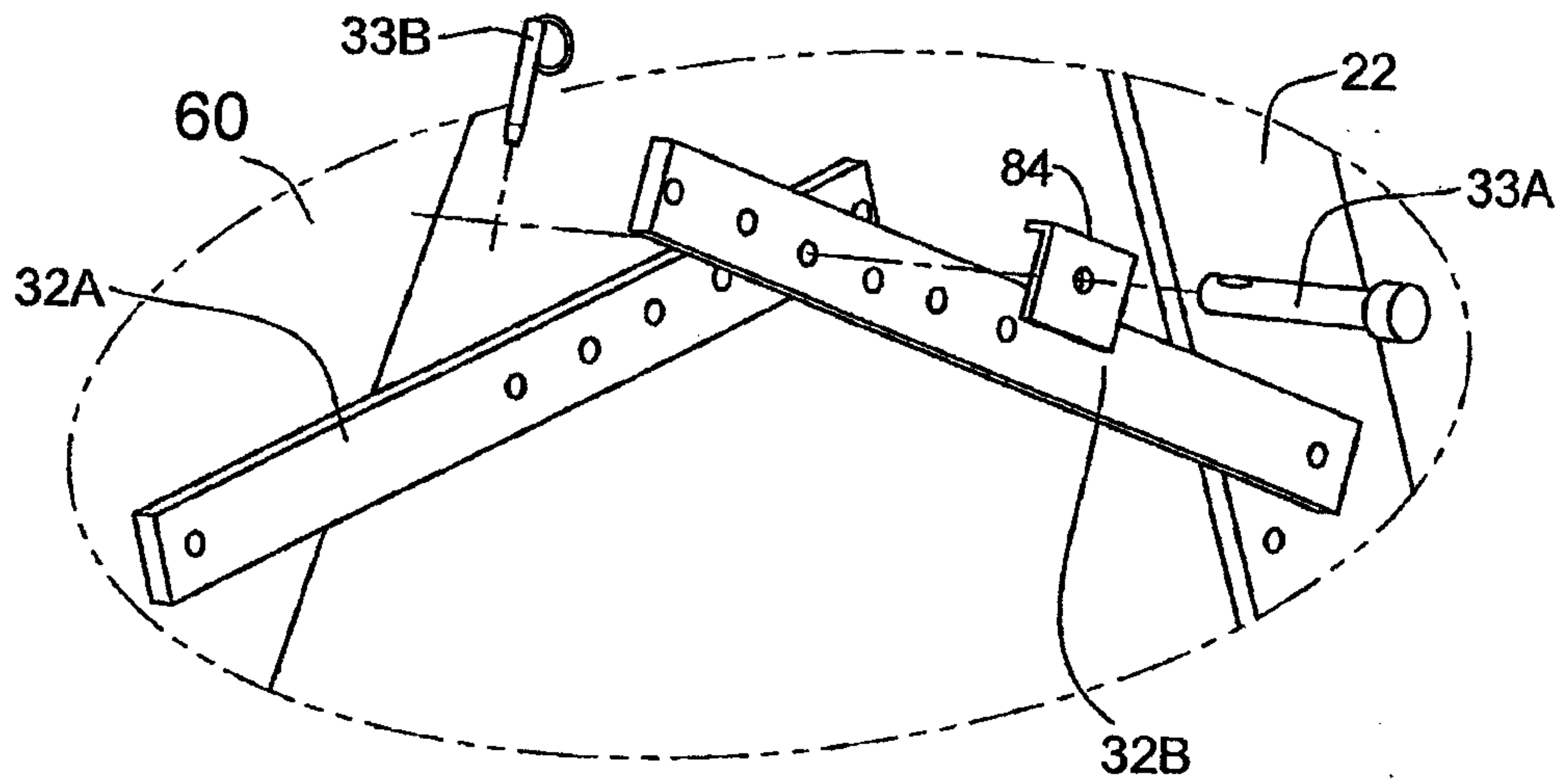


FIG. 6

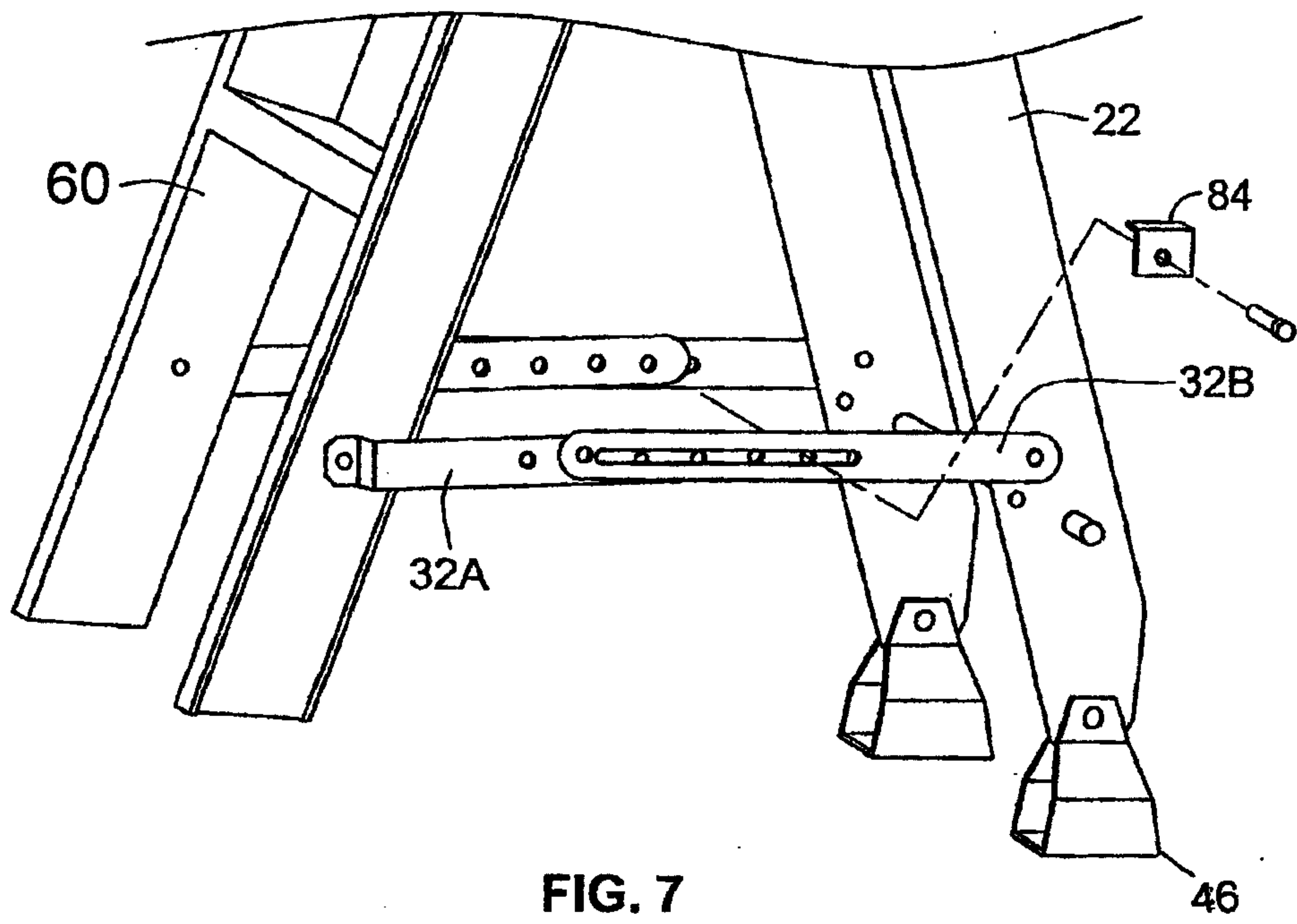


FIG. 7

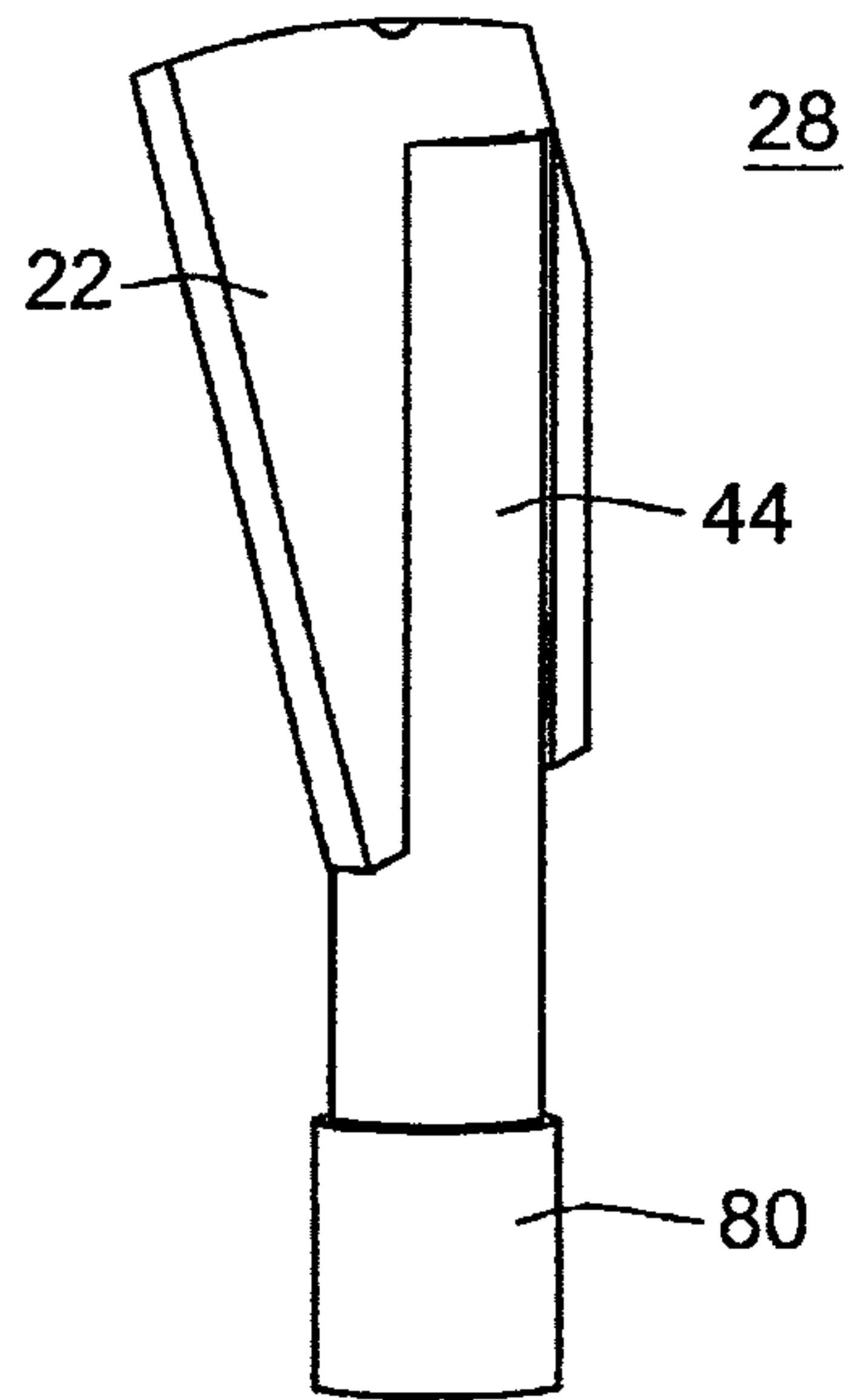


FIG. 8

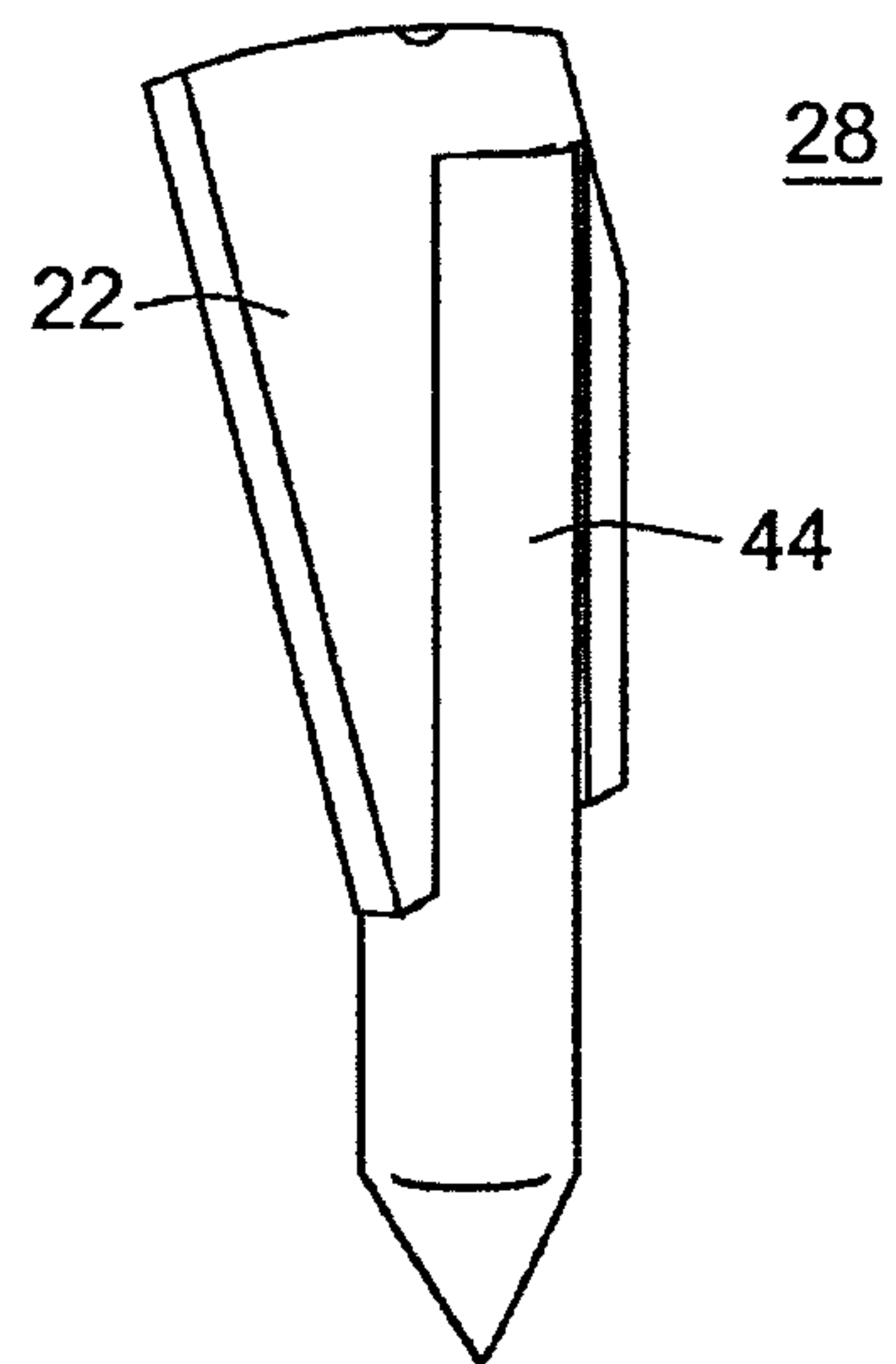


FIG. 9

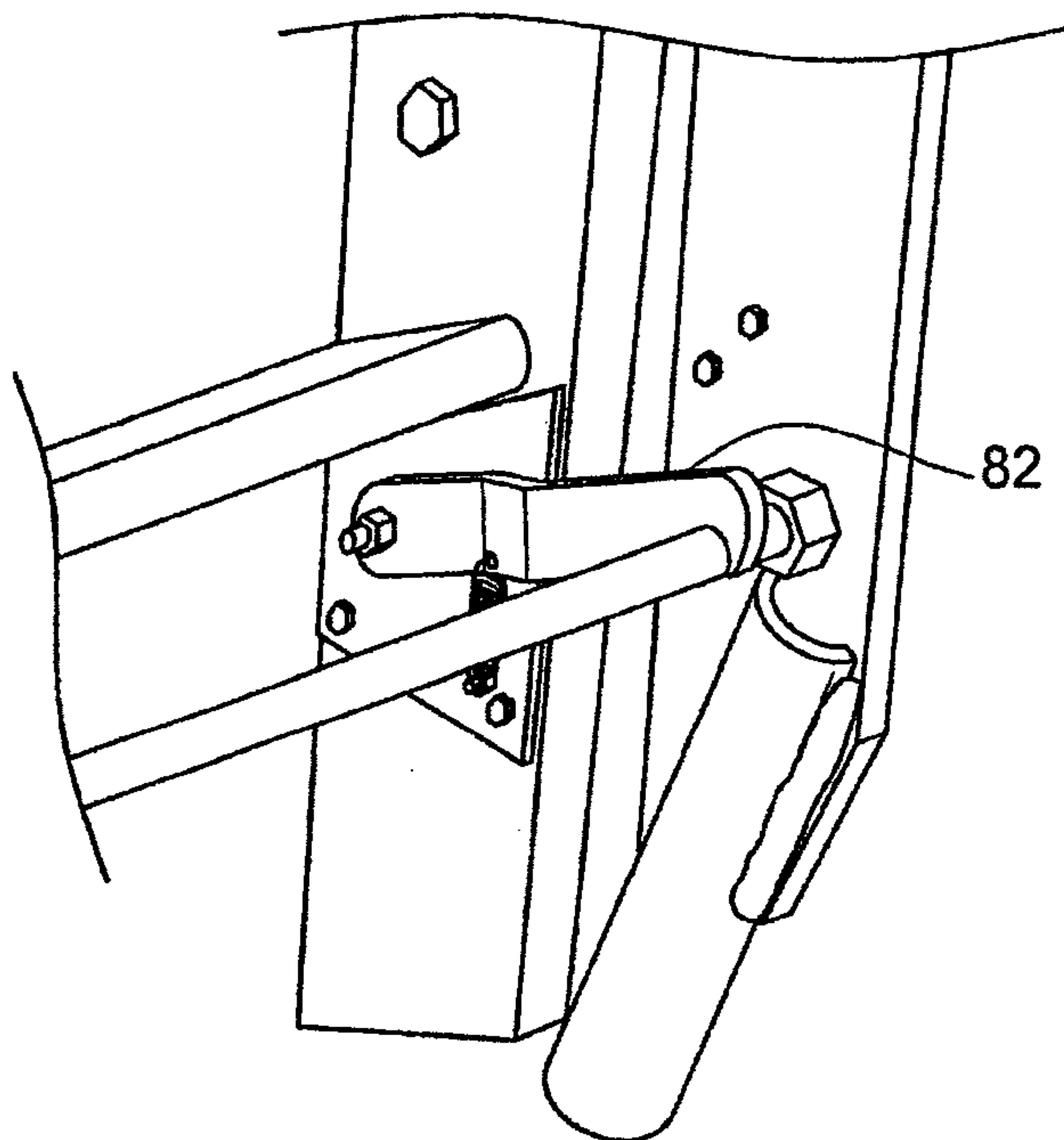


FIG. 10

